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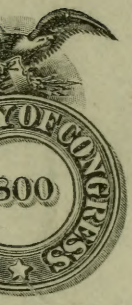

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Manual of Instructions

For County Forest Wardens and District Forest Wardens

And Information in Regard to the Prevention and Suppression of Forest Fires

J. E. BARTON
STATE FORESTER
1915

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AND

Information in Regard to the Prevention and Suppression of Forest Fires

Kentucky State board of forestry

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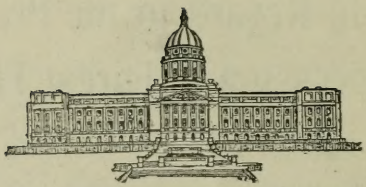

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INTRODUCTION.

In the handling of any situation successfully it is obvious that the first thing which is necessary is a systematic investigation of the subject as it presents itself at the immediate moment when the work is undertaken. In the fight against tuberculosis, for instance, the first step is to have a definite knowledge of how much tuberculosis there is in the city or community involved; to have a definite knowledge, in so far as obtainable, of its causes and effects and conditions which promote or retard the disease. The same proposition is true with regard to the regeneration of a business in the hands of an efficiency expert. His first care is to gather and obtain facts with regard to the business as it then exists, and to observe all the details of the organization and operation; then to systematize and correlate his results with a view of determining the cause and effect of the conditions as he finds them so that he may change, modify and remedy where it appears necessary. Exactly the same thing obtains as regards forest fires. If a system of protection from forest fires in the State is to be built up successfully, the first thing desired is to know the number of the fires within the State and a large amount of additional features which naturally present themselves in investigations of this character, such as extent of acreage burned over, the attitude of the community with regard to forest fires, the best means of suppressing them, etc. Protection of the forests forms one of the essential factors on which the practice of scientific forestry in any State rests, and no forest policy within Kentucky is conceivable without adequate protection against forest fires, since it would be the height of folly to reforest one thousand acres of land to walnut and at the end of five years have the area burned over so that the result of

five years' growth is absolutely destroyed. When the matter of forest protection within Kentucky was discussed at first, it was patent that such a thing as danger and loss from forest fires was entirely unheard of by a great number of individuals. Indeed, it was said when the State Forester first took up the work and spoke of the necessities in this direction, that this was a phase of the work with which he would have no trouble, since Kentucky had very few forest fires. The records and data so far obtained do not show this, and they are valuable in calling to the attention of the public, and more especially those directly interested in the forest fire situation within the State, the necessity for adequate protection from forest fires, since such protection cannot be looked upon in any other light than as property insurance.

PROPERTY INSURANCE.

There are a large number of interests in the State which are vitally concerned with regard to this matter of forest protection. The lumber interests, which depend upon the forests for their supply of material, are most keenly interested, since the forests constitute their stock in trade. Other interests which are to a large extent concerned are the railroads, which draw from the forests for large supplies of ties, poles, posts, bridge timbers, and other material; the telephone and telegraph companies, which depend upon the forests for their supply of poles; the tanning industry, which depends upon the forests for its supply of tan bark; and the mining industry, which uses between three and four feet of timber board measure for every ton of coal mined. There are also many other industries more or less dependent upon the resources of the forests of the State.

SYSTEMATIC EFFORT NEEDED.

The first systematic attempt to deal with the forest fire situation in Kentucky was made in the fall of 1913

when about one dozen county forest wardens were appointed in certain counties in the eastern part of the State. This county forest warden system has increased during the year of 1914 very materially, and with the growth of the system and the increase in the number of men in the field the necessity has been felt of putting in definite printed form all the instructions which have been issued heretofore covering the method of procedure, reports and other details of the work in hand in order that this information may be readily available for the men now in the service and for any new men who may be added to the list of those already appointed. It is also expected that this book will be of general interest and for that reason matter has been included in its pages which is not, strictly speaking, intended for the instruction of the men in the field.

THE WEEKS LAW.

By act of Congress, approved March 1, 1911 (36 Stat., 961), a bill was passed which had as its primary purpose this object: "To secure the maintenance of a perpetual growth of forest on the watersheds of navigable streams where such growth will materially aid in preventing floods, in improving low waters, in preventing erosion of steep slopes and the silting up of the river channels, and thereby improve the conditions for navigation."

"While the improvement of the flow of navigable streams is the fundamental purpose, other benefits incidental in character but nevertheless important will be kept in view. Among these are: (1) Protection against disastrous erosion of the soil on mountain slopes and against the destruction of the soil and forest cover by forest fires; (2) Preservation of water powers, since, like navigation, they depend for their value upon the regularity of stream flow; (3) Preservation of the purity and continuity of flow of the mountain streams, with a view to their use for the water supply of towns and cities; (4) Continuance of a timber supply to meet the needs of the industries of the country; (5) Preservation of the beauty and attractiveness of the uplands for the recreation and pleasure of the people."

Work under this law has divided itself into two heads: (1) The acquisition of lands upon the watersheds of navigable streams in various states for the purposes detailed in the law; (2) The co-operation of the federal government through the Forest Service of the U. S. Department of Agriculture with the various states in the protection of the forests at the headwaters of the navigable streams from destructive agencies, the chief of which, of course, is fire. An appropriation of money was made available for such protection. This co-operation in-

volved the execution of an agreement between the Secretary of Agriculture of the United States and the proper State authorities whereby the secretary agreed to spend a certain sum of money for forest fire protection on certain fixed watersheds provided the State entering into the agreement would agree to spend a like sum; in other words, the federal government and the State would share equally in the expense of the protection. Already some twenty states have entered into such agreement and Kentucky was one of the latest states to do so. Under the terms of the agreement Kentucky was allotted $4,000 by the United States Secretary of Agriculture for the purpose of forest protection and a like sum was allotted for the year 1914. With this federal co-operation in mind a plan of protection against forest fires was prepared for the State and put into effect.

STATE FIRE PLAN.

The fire plan adopted by the State Board of Forestry was as follows:

(1) The State Board of Forestry, through its chairman, shall enter into the usual co-operative agreement with the Forest Service of the United States Department of Agriculture whereby it can secure co-operation with the federal government in the matter of fire protection, and take advantage of the $4,000 allotted by the United States Secretary of Agriculture for that purpose.

(2) In pursuance of this agreement the State shall be divided into ten fire patrol districts for administrative purposes in accordance with a map which is made a part of the fire plan.

(3) Two patrolmen at large shall be appointed for the present to serve throughout the year, whose duty it shall be to organize the fire patrol systems in the various counties and see that the system is carried out in full.

The salary of such patrolmen shall be $900 per annum, payable monthly, and they shall be allowed traveling and field expenses not to exceed $600 per year.

(4) During the danger season for forest fires, approximately three months, patrolmen will be appointed in such counties as the danger warrants.

(5) The close co-operation of the Fish and Game Commission will be secured wherever practicable.

(6) The active co-operation of timber land owners, railroads, etc., will be encouraged and secured wherever practicable.

STATE FIRE PROTECTIVE SYSTEM.

The fire protective system of the State may be divided into the work which is accomplished by the various officers in charge of this work.

THE STATE FORESTER.

The State Forester under the direction of the State Board of Forestry and as a Collaborator in the United States Department of Agriculture has general charge of the fire protective work in the State. The district fire wardens are appointed to take charge of a district in the State which is composed of a number of counties, usually not over ten in number in any district. Of course, the smaller the district the more intensive the inspection and supervision of the district fire wardens can be. At the present time there are four district fire wardens in the State, three in the eastern part of the State and one in the western part of the State. It may be expected that the number of these wardens will be increased as the scope of the work is enlarged and as the funds available for the work are increased.

COUNTY FOREST WARDENS.

The county forest wardens are officers of the State empowered "to enforce all the forest laws enacted, to protect the State forest reserves, to see that all rules

and regulations are enforced, to report violations of the law to the State Forester, to assist in convicting offenders and to make an annual report to him of the forest conditions in their immediate neighborhood." Whenever it becomes necessary because of sickness or other urgent reason for a county patrolman to be off duty, he shall employ and pay a qualified substitute to serve in his place. In the event of absence aggregating more than two (2) days a month, the name, address, and period of service of each substitute employed, and the reasons for such employment should be reported at the end of each month. The names of both regular and substitute man should then be placed on the payroll for the respective time each has served that they may be paid accordingly.

In connection with the patrol of the county, the forest wardens should make every effort to get in touch with the rural mail carriers and secure their co-operation in connection with the discovery and notification of a forest fire. An order has been issued by the postoffice department covering this character of service on the part of rural mail carriers, which is given in full. If rural mail carriers refuse to perform this sort of service, the forest wardens should call it to the attention of the State Forester.

ORDER NO. 6315.

The following instructions are promulgated for the guidance of the postal employees concerned:

"In accordance with the request of the Secretary of Agriculture, this department has arranged a plan of co-operation with State and National forest officers whereby rural and star route carriers shall report forest fires discovered by them along their routes to persons designated by the State and National authorities to receive such intelligence.

"Co-operation with the State officers will be given in the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New

Jersey, Pennsylvania, Maryland, West Virginia, Tennessee, Kentucky, Michigan, Wisconsin, Minnesota, Idaho, Washington, Oregon, and California.

"The national forest officers will be co-operated with in the following states: Florida, Arkansas, South Dakota, Wyoming, Colorado, New Mexico, Arizona, Utah, Montana, Idaho, Washington, Oregon, and California.

"The State and National authorities will inform postmasters as to whom the discovery of fires should be reported, and each rural carrier should be directed to cooperate to the fullest extent with such authorities in the manner agreed upon, namely: that the carrier shall report a fire to the nearest State fire warden or officer on his route, or if no such warden or National officer lives on the route, to arrange through some responsible citizen to have him notified, by telephone, if possible. Star route carriers are included in the plan of co-operation and should be requested to report the discovery of fires in the same manner as will be done by the rural carriers.

"Postmasters in or near national forests are also directed to report fires to the nearest forest officer."

DUTIES OF COUNTY FOREST WARDENS.

The duties of the forest wardens divide themselves roughly into two classes: (1) the prevention of forest fires, and (2) the suppression of forest fires which may occur. Undoubtedly, the most import feature of the work is to prevent the occurrence of forest fires if this is at all possible, consequently the county forest fire warden will find that his duties involve a great many phases of activity. In the first place he should be as thoroughly familiar with the county to which he is assigned as it is possible to be. To accomplish this he should take every occasion to make trips over the county and extend his acquaintance among the people of the county so that he may secure their co-operation and assistance in the work which he has

undertaken. He should familiarize himself thoroughly with all the routes of travel through out the county and the easiest method of reaching each section from his headquarters, wherever it may be. He should familiarize himself, not only with the main routes of travel, but with the trails and short cuts through the mountains from one vicinity to another. In addition he should provide himself with some means of transportation. This would usually be a horse, since in the mountain section of the country the only sure means of travel during most of the season is by horseback. It is impossible for a county warden to cover the amount of ground with the frequency which he should without a horse at his disposal. He should acquaint himself with all the means of communication in his county—telephones, telegraph and rural carriers—in order that he may be able to take advantage of the quickest means of communication for obtaining information with regard to forest fires which may occur and directing operations when forest fires are under way. When one county warden is assigned to each county it is in a large measure impracticable that he should cover the county with the frequency which is desirable. To offset this he will find it possible in a great many instances to establish such relations with individuals in various sections of the county that they will undertake for him to notify him of forest fires which may occur and to engage in the suppression of such fires when they do occur until the arrival of the forest warden or to take charge of a fire entirely providing the warden is so occupied in other quarters that he is not able personally to get to the fire. Cordial relations with a considerable number of individuals in the county who will undertake this character of work will add very decidedly to the efficiency of the county forest warden, and in some instances will relieve him of considerable burden of work in some directions by affording him opportunity to undertake additional work in others. Since

the main object of the fire protective work is fire prevention, every opportunity should be taken by the county forest wardens to bring to the attention of the people the character of work in which he is engaged, the danger of forest fires to property and life, the value of the resources destroyed and the effect upon the community which the destruction of the forests as a resource will cause. In this connection a campaign of publicity will suggest itself, and the method of obtaining the desirable publicity will vary with the individual, but there are certain channels through which all publicity may be most easily disseminated. Under these come the newspapers, the schools, county meetings of various sorts and the posting of notices with regard to forest fires, which are furnished by the office of the State Forester for that purpose. These notices may be repeatedly torn down or destroyed by careless individuals, but they should be replaced by the county forest warden whenever this is done.

When a forest fire actually does occur in spite of all efforts to prevent such fire, the forest officer should immediately repair to the scene of the fire and undertake its suppression. The smaller the fire is and the earlier the work of extinguishing it is undertaken the less the amount of work involved and the easier the proposition of handling it. In this connection it will suggest itself to the county warden that, if he can get a large number of individuals interested in extinguishing small fires as they may occur, he will have accomplished a great deal in the direction of forest protection for his county. When fires of large size do occur, as is frequently the case, it is the duty of the county warden to undertake their suppression. In a large fire he will find as a usual thing that he is not able to accomplish very much alone. In this connection additional help must be obtained and so far as practicable should be obtained from the citizens of the neighborhood who have an interest in suppressing the fire. Indiscriminate

hiring of labor for suppressing of forest fires is apt to encourage setting of additional fires rather than being a means to the suppression of the forest fire nuisance, therefore, in the future the State Forester will not authorize any hiring of this class of labor. Fires which occur on the land of individuals because of clearing land, burning tobacco beds or from whatever cause should be extinguished by such individuals without pay. Fires set by logging railroads or sawmills should be extinguished by the individual or company responsible without pay from the State.

DANGER SEASON FROM FOREST FIRES.

There are two seasons of the year when forest fires may ordinarily be expected. One of them occurs in the fall, approximately from the first of October to the middle of December. The other season occurs in the spring, continuing approximately from March 1 to May 1. Both these seasons may be materially lengthened or shortened by climatic conditions. There is nothing definite about these seasons and the county forest wardens will be retained only so long as the actual danger from forest fires exists.

PATROL ROUTES.

It will suggest itself to the county forest wardens in connection with the patroling of the district that definite patrols should be established, and it is necessary that this be done before a definite letter of appointment can be issued. This serves two purposes: the systematizing of the work of the forest wardens, and it gives the State Forester and the district forest wardens an opportunity to have some check on the work the county wardens are doing. In fixing the patrol routes of the county there are a great many things which must be taken into consideration and the greatest of these is the fire hazard; that is, the relative danger from forest fires which may reasonably

be expected in the various sections of the county and the frequency with which fires occur in different parts of the county. It may be that there are certain portions of the county in which there is a large open agricultural region. If this is true, it natrually follows that this section of the county is not one in which there is any great danger from forest fires, if there is any, and consequently in laying out the patrol, these routes will not be planned to cover this agricultural territory except in unusual cases where it is necessary to cover this territory to reach other regions. Also, in connection with the patrol routes after they are once laid out the greatest attention should be given to those routes which go through sections of the county where forest fires have been found within the experience of the wardens most frequently to occur. Other routes may be travelled, but, if the experience of the warden shows that on any patrol route fires infrequently occur, this route should be patrolled only at infrequent intervals—just often enough to keep in touch with the people who live along the route and the conditions which there exist. It should be the aim of the county warden in connection with these patrol routes to study his county and so to inform himself that he may have definite knowledge of where in the county the fire hazard is the greatest.

FOREST FIRES.

All forest fires may be classed under three heads: (1) surface; (2) ground fires; (3) crown fires. Surface fires burn along the surface of the ground; ground fires burn into the ground itself, consuming decayed logs, the humus and duff and even the ground. The crown fires designate a fire which reaches up into the top of trees and consumes everything in the nature of forest growth in its path. This latter class of fires falls usually, in the beginning, into one of the other classes. The causes of fires are decidedly varied, as has been indicated by the

season just passed. In connection with each forest fire it should be the duty of each county warden to ascertain, if possible, the cause of the fire and indicate this in connection with his report, since it is only by study of causes of forest fires that any method of control in the future may be devised. Sometimes it is possible to indicate the probable cause of fire without being able to state definitely the actual cause. In cases of this character where the cause of fire is reasonably certain without being absolutely determined, it is better to set down the probable cause of the fire: (e. g. "probably hunters") than to give the cause of the fire "unknown," since it is only by a careful study of the causes that adequate methods of suppression of forest fires can be devised. Among the causes of forest fires in accordance with the classification in use at the present time by the office of the State Forester are: (1) Lightning; (2) railroads; (3) sawmills; (4) brush burning; (5) campers; (6) incendiary; (7) miscellaneous; (8) unknown. (1) Fires which start from lightning are of frequent occurrence and are always definitely to be determined; (2) fires which start from railroads may start from one of several agencies—locomotives, passenger or freight engines, either from the sparks or from the ashes dumped from the ash box. The fires attributed to railroads may start from logging engines and also steam shovels or plows. (3) Sawmills. Under this cause may be grouped fires which start from any character of saw mill either permanent, temporary or portable, or from logging donkeys in the woods. (4) Burning brush. Under this head may be classed fires which escape from clearing land or clearing right of ways or from fire set to aid in clearing any other character of operation. (5) Under the heading of campers may be classed not only campers but hunters of various kind, such as coon hunters, bee hunters, berry pickers, smokers, children, etc., who make fires in the woods and leave them to burn unattended. Under the

heading of incendiary will fall all causes for fire where it is expected that individuals set fire to the woods maliciously and left them to burn. (8) Miscellaneous. Under this heading may be grouped any cause which ordinarily might not be expected to cause a forest fire, such as a spark from the chimney of a house, a burning building which sets fire to adjacent woods and the sun reflecting on a glass bottle so that the glass bottle acts as a burning glass and other causes of this character. It will be observed that most of the fires are preventable with the exception of those caused by lightning and incendiaries, and the efforts of the county wardens should be to reduce the causes of preventable forest fires down to the minimum.

In connection with the actual fighting of forest fires, all wardens should bear this in mind, that there is no such thing as its being impossible to control and suppress a forest fire, common opinion to the contrary notwithstanding. A forest fire in its early stage is easily extinguished while in its later stage it may take some time—often several days—to control the fire, but eventually this can be done, and the work of this office in the matter of protection against forest fires is based on this fact. Even the worst forest fires which are impossible of control during an extremely high wind become capable of suppression when the wind abates.

The usual method of fighting forest fires and, undoubtedly, the best method of attack is what is called by the rangers on the Western National Forests "running a fire to a point or a peak." This is accomplished by going a certain ways ahead of the fire to some point of natural vantage (such as an open place in the woods, trail, road or bridge) and heading the fire off at this point by reducing the face of the fire until eventually the advancing front is reduced to a point. The actual method of reducing the front of a fire to a point may be varied by the circumstances and the existing natural features of the

country. It may be necessary to trench ahead of the fire, to take a right of way clear of leaves, or to back fire along a road, trail or ridge. It is possible only to suggest these features of fighting forest fires since they vary considerably in each section or region where a fire occurs, but the ingenuity of the individual will suggest taking advantage of natural barriers and fighting from them as a basis.

There are some features of forest fires which need emphasis, and they are as follows: A surface fire or any forest fire burns rapidly up hill but burns slowly down hill. A forest fire also burns slowly against the wind. Most of the fires with which you will have to deal are ground fires—that is, they burn in the leaves on the ground. Since this is so, a very small break will stop a fire long enough to give a man a chance to fight it. A trail, a small stream, a road or any such feature will form a point of vantage to work from. Another thing, fire burns a great deal less fiercely at night and in the early hours of the morning, and a great deal of advantage may be gained by trenching or other operations against a fire during these hours, provided it is at all feasible. Also in dealing with forest fires, the early morning and late evening hours are usually more favorable to a man who is working than the hours in the middle of the day, since he is not handicapped by the heat.

FIRE FIGHTING TOOLS.

Just what are the best tools for fighting forest fires in Kentucky so that the character of tools used may be standarized has not been definitely determined. Various county wardens have desired to use a variety of tools, including rakes, shovels, hoes, and pitchforks. The especial tool of these enumerated, which suits the conditions, will be largely determined by the locality in which the fire occurs and the character of the fire to some extent. In the case of a surface fire (and a large number of the fires

which occur are of this class) undoubtedly, rakes and pitchforks and possibly hoes are the best tools to use. These are easily obtained, sometimes locally, but more often by purchase at the local stores. When a supply of this material is purchased locally, the bill covering it should be submitted to the office of the State Forester, where voucher for the purchase will be made out and returned for signature to the individual or company from whom the purchase was made. Each county warden on his patrol routes should carry with him some character of fire fighting tool in order that he may be prepared, when he discovers a small fire at any time to extinguish it, provided it is possible for one man to handle it. If he does this, it will often be found that he can control a fire himself at the moment of finding it, which, were he obliged to go any distance to get some character of tool, would be too large for handling by any single individual.

LOOKOUT TOWERS.

It has been the general experience in connection with forest fires that the prime necessity in connection with the suppression of them is to get to the fire at the earliest opportunity. In order that this may be done it is necessary that the fire be discovered as soon as it is set from whatever cause. With the extent of territory which must be covered in Kentucky and the comparatively limited amount of funds available, the number of patrolmen which can be placed in any individual county or region is relatively small. Under these conditions the problem is to make the services of the men available extend over the largest amount of territory possible. It naturally suggests itself in this connection that high points from which a large extent of territory can be viewed are good places from which fires may be discovered. In several instances individual patrolmen have selected available points which command a good view of the surrounding country and

which are readily accessible and have used these as points from which to detect forest fires as early after they are set as possible. This has served in a measure. However, if the high point is used just as it is without any improvements on it, it has several disadvantages. In the first place (and this is particularly true in the hardwood regions of Kentucky), the view is usually interfered with by trees and undergrowth. In the second place, when a fire is discovered, if there is no way of communication from the lookout point to individuals who will fight the fire, the chances are that a good deal of time is lost in getting to the fire and beginning operations for the suppression of it. In view of this fact since the utility of lookout points in certain regions and under certain conditions seems to be fairly well determined, it is well at this time to call attention to the manner in which lookout points may be made most available for the detection of forest fires and for beginning operations of suppression at the earliest practicable moment. In order that the view from the lookout points may be unobstructed, a lookout tower will readily suggest itself as the natural means of overcoming this difficulty. Towers of this character have been used very widely in the United States both on the National Forests and also in the individual states. Massachusetts, Minnesota, New Hampshire, Wisconsin, Maryland, and others have erected numbers of these towers and have put them into operation.

The general character of the towers is a supporting substructure usually 4-cornered, tapering from the base to the top, where a platform is erected for observation purposes. This platform may be covered or not as the circumstances warrant. The elevation of these towers above the surrounding trees and undergrowth usually affords an uninterrupted view of the surrounding region and this is oftentimes greatly enhanced by cutting down a few trees which interfere to a more or less extent. The material of

which these lookout towers are made may be of wood taken from the surrounding forest or it may be steel. Steel towers in the general experience of those who have tried them seem to be the most satisfactory and are cheaper in localities easily accessible to railroad shipping points. Wooden towers are less expensive in localities at considerable distance from a railroad shipping point or back from any good roads. In selecting a lookout point the facilities of transportation of material should be borne in mind. Oftentimes it is possible by the selection of a well placed tree to build an extremely cheap and at the same time serviceable station by cutting away the limbs of the tree and by cutting off the top at the point desired and erecting a platform in the top of the tree and placing the necessary ladder to reach the platform. This has been done in one instance within my knowledge in Eastern Kentucky. The cost of construction of these towers varies with the kind of material used and the facilities of getting material to these points. I think it is safe to say that for a four cornered wooden tower made out of material on the ground the cost will run up to $100, varying considerably with the conditions; and that steel towers will run up from $100 to $300, varying with the height of the tower and conditions. Data which is on file in this office shows a steel tower 18 feet square at the base by 10 feet square at the top, made of 4x4 angle iron, will cost approximately $225 f. o. b. shipping point. The building at the top of the tower will cost approximately $75. This does not take into consideration the cost of erection and construction or transportation. A 30 foot tower of 3½x3½ angle iron and 5-16 cross rods will cost approximately $175 f. o. b. shipping point. A 30 foot tower in this State will usually serve all purposes. To make the lookout tower effective there should be some means of communication from the tower to the patrolmen, who will be in position to go immediately to the fire and suppress it. What this means of communica-

tion between the tower and the station of the men is will depend on circumstances. The best system of communication, of course, is the telephone. In a great many instances a heliograph arrangement may be used with success, as has been done on several of the National Forests in the West. Also, some pre-arranged system of signals by flags may be carried out, as has also been done successfully. The equipment of these lookout towers in order that they may be made most effective is to provide a map of the country and secure the location of fires by a system of observation taken through alidades with relation to the permanent map located in the lookout station. The map should of course be oriented to conform with the country in which it is to be used. From a station of this character the limit of range will vary greatly, depending on the natural configuration of the country in which the station is situated. This may be stated roughly as from 10 to 20 miles and may vary so far as the individual station is concerned, depending on the outlook in any direction. It is safe to say, I think, that the average will be approximately 15 miles. With these facts in mind it appears that a few well selected stations properly provided with means of communication would do the work of a large number of patrolmen, and that while the extra cost of installation is somewhat large this would more than offset the decrease in the wages of the patrolmen made necessary by the use of the stations. These facts are recommended particularly to the attention of the forest fires associations in Kentucky for their consideration, since they are through their resources best able to secure the construction of such lookout stations as are here recommended. The office of the State Forester is in position to supply definite information with regard to these stations and to answer all questions with regard to their utility and feasibility.

A lookout station in operation this summer near Jenkins on the lands of the Consolidation Coal Company has demonstrated its efficiency very satisfactorily.

REPORTS.

There are various reports which it is required that the county fire wardens submit, covering the work which has been done by them. These will in part be submitted to the district fire warden and in part to the State Forester. It is expected that these reports will be made out carefully and in detail and that they will form a complete record of the work done by the county warden in any season. These reports should be submitted on the forms furnished by the office of the State Forester. A loose leaf cover is furnished each man under appointment in which the forms necessary for reports should be kept for the sake of convenience. A limited number of blanks of each form will be sent to the county forest warden at the time of his appointment. As additional blanks are needed they will be supplied by the State Forester on request.

Form 1. This is a payroll which is submitted by the State Forester to the Auditor for payment covering the services of all men in the field.

Form 2. Daily Report Blank. On this blank should be made out each day a record of the work done. Each day should be accounted for on the report submitted, and when no work is done on any particular day this fact should be so stated on the report blank and the reason for not doing the work or why no work was necessary should be stated on the blank also. At the end of the month all these blanks should be sent to the State Forester for his inspection and in a 30-day month each day should be accounted for as also in a 31-day month. Since spaces are provided for the record of two days on each blank form, there will usually be sent in by each man either 15 or 16 Forms 2. In February, of course, only 14 blank forms will be filled out and submitted.

Form 3. On this form should be submitted the time of all temporary laborers who are hired by a county forest warden to extinguish fire. It is not intended that

the time of a county warden himself will be submitted on this form. The form may, however, be used for submitting a statement of the amount of labor performed by any temporary laborer. At the top of the form should be stated the name of the man to whom money is due and his address, the month during which he was employed and the year. The days on which he was employed and the rate of pay and the amount due him, together with any remarks, should be included in the body of the form. The numbers under "date" column indicate the days of the month. If on the 15th of the month a certain individual works 5 hours at the rate of 25c per hour, the entry should read as follows:

Date	Time	Rate	Amount
15	5 hours	25c	$1.25

The officer in charge of the work should sign his name at the bottom of the form.

Form 4. This form is intended to cover special work in connection with the inspection of railroad engines and will not be generally furnished but will be provided only to such men as are assigned especially to this character of work.

Form 5. Fire Report. These reports should be numbered by each warden serially during any calendar year. All of the blanks discovered should be filled out. Your attention is especially directed to the blank space provided for outlining the cause of the fire as has heretofore been stated. The cause of any forest fire should be especially investigated and, if it is possible to determine the cause of the fire, this should be so done. If the exact cause cannot be determined and the probable cause is determined within a reasonable certainty in the mind of the county forest warden, the probable cause should be given with the statement to the effect that it is probably the cause, as for instance, "probably hunters." It is not expected that the warden will guess at the cause of

the fire. It is better to write down "unknown" than to make a guess of this sort, but on the other hand there are instances where the forest warden is reasonably certain of the cause of the fire without being actually satisfied that this is true. All the blanks on the fire report should be filled out, especially those on the back of the form. This office is especially interested in the number of acres burned over and all the other information asked for on the back of the form. This information should be determined as accurately as it is possible for the individual to do it. Probably the greatest trouble will be had with the amount of and value of timber destroyed and only experience will give the county forest warden the knowledge accurately to estimate this damage, but he should conscientiously endeavor to ascertain the cost of this damage. If he is not able to estimate in feet board measure a stumpage value for the reason that the timber in his region is usually sold by the acre or by the tree, it is permissible for him to estimate the damage in this fashion and it can then be reduced to other units by the State Forester. The damage to young growth is one of the hardest propositions which the county forest wardens have to deal with. There seems to be no definite understanding of the value of the young growth. For the purpose of computing the damage from fire, this office has tried to provide a rule which will help out the county forest warden in the absence of more definite information. Young growth may be considered for the present as increasing in value at the rate of 25c per acre per year; that is, if the average age of young growth on an area, which has been burned over, is three years, the value of the young growth will be three times twenty-five cents, or 75c per acre, but to this should be added $5.00 which may be taken as the cost of replanting forest growth on an acre of ground. This method of figuring the value of young growth may be applied to timber up to

ten inches in diameter. If the young growth is very decidedly of two ages, say three years and twelve years, the two different ages should be used in computing the value of the young growth and no average of such a wide difference in years attempted. There is no blank space provided on the fire report for the signature of the forest officer who makes the report, but each report should be signed by the county forest warden making it at the bottom of the back of the form.

Form 6. It is expected that post card, Form No. 6, will be submitted at the end of each week by each county forest warden to the district fire warden whose address will be furnished in the beginning of each fire season. There is one detail of the information asked for to which I desire to call your attention, the 2nd caption. Under this caption, it is intended that the county forest warden will give the number designation of the route patrolled by him as outlined in his letter of authorization; for instance, his letter of authorization has a Route No. 5 which covers a certain territory and, if he has patrolled that route during the week, it is expected that he will put it after the 2nd caption "No. 5." If he has also patrolled No. 7 and No. 8, these should also be added. There has been confusion in this respect. Certain county wardens have indicated the total number of routes patrolled, as for instance 3 where they have patrolled No. 4, No. 7 and No. 3, and 4 where they have patrolled No. 1, No. 4, No. 7 and No. 3 instead of giving the number of the routes as called for. Under the caption of "Notices posted," if it is possible to do so, place where these notices have been posted should be given. At the end of each month during the fire season, the post cards should be mailed by the district fire warden to the office of the State Forester.

DISTRICT FIRE WARDEN'S EXPENSE ACCOUNTS.

The district fire wardens are allowed their traveling expenses. Through a recent ruling of the Auditor and in compliance with the law passed by the session of the legislature of 1914, it is necessary at the present time that each expense for traveling amounting to $1 should be covered by sub-voucher. This sub-voucher should be filled out and submitted with the account. Account should be completely itemized for each detail of expense incurred. Through recent ruling of the Auditor, expenses incurred for chair car during day travel, for tips, or exorbitant charges for lodging will not be allowed.

PROSECUTIONS FOR VIOLATIONS OF THE FOREST LAW.

In connection with fires which have occurred and especially in connection with the arrests which have been made and the attempts which have been put forward to secure indictments before the grand jury for fires which have been set out, the necessary information often has been lacking to secure convictions and indictments and also in some instances the witnesses upon which the State depended to establish its cases were not reliable when it came down to the point of trial. They changed their testimony from what they had previously given to the county warden. In this connection certain points must be made clear which should be borne in mind in connection with the working up of cases of fire trespass. In the first place when a forest officer finds that a fire has been set either willfully and left to burn or has been set and allowed to burn through the neglect and carelessness of an individual or corporation, he should in all cases endeavor to secure as much first hand information on the ground as he possibly can. This information he should jot down in his note book at the time investigation is made, since it would be permissible

to use such evidence when trial comes up to refresh his memory. This information should be as complete as feasible and should include the day, month, year, time of day, etc. Another important feature of the investigation is the direction of the wind at the time of the fire, since this is in a good many cases the determining factor as to the way in which the fire spread. This is especially true in regard to railroads and the fires which occur on rights of way. It should also include the accurate location of the fire and the size of the territory burned over should be estimated as closely as possible. In a good many instances the best way to obtain this is by pacing around it. The amount of damage done should also be ascertained in as much detail and with as great care as the circumstances warrant. In addition the witnesses to it should be questioned, and, if possible, a statement signed by them should be obtained at the time, setting forth the facts with regard to the fire, which may be used in connection with investigation before the grand jury or trial in any court. This would also serve as a check against changing of testimony by individuals at the time of trial or before the grand jury. It is always advisable, when possible, to have the county warden's report and investigation witnessed by some disinterested individual so that his testimony is not unsupported. It must be borne in mind that information secured at the time and on the ground is of a great deal more value than any information subsequently gathered.

CORRESPONDENCE.

Upon request of the county forest wardens, a limited supply of paper, envelopes and stamps will be furnished him to use in his official correspondence. He should request a supply of this ahead of time in order that he may have a supply on hand. At the present time it does

not seem feasible to furnish directly from the office of the State Forester other material than that herewith specified.

MAPS.

In connection with the matter of the protection of the forests of the State from fire it is essential that there be adequate maps covering the details of the forest fire plan of the State between the State Forester and all the county forest wardens. The State Forester's office is having prepared maps of the State on which will be placed information of a character which the county forest wardens will find helpful in connection with the work. They will also be expected to furnish to the office of the State Forester from time to time additional details of the conditions which exist in their county, which will be of use in the State Forester's office and to the District Fire Wardens in determining the points of greatest fire hazard, the patrol routes requiring the greatest attention, the patrol routes in general and all other factors which enter into the proper pursuance of the work. As rapidly as possible, large maps of the individual counties provided with county forest wardens will be compiled and put in the hands of the county forest wardens, since it is felt that without maps of this character a great deal of information accumulated by the individual county forest warden will be lost upon the resignation or the discontinuance of the services of any individual warden. It is also felt that maps of this sort will be of the greatest assistance to the county forest wardens in their work.

COUNTY FOREST PROTECTIVE ASSOCIATIONS.

Since the amount of funds available at the present time for forest fire protective purposes in the State is limited and it is not ordinarily possible to place more than one county warden in each county, it is evident that the character of patrol will not be as intensive as de-

sirable unless various agencies within the county can be enlisted to help in this work. Individuals, companies and corporations, who are timberland owners or lessees, might naturally be expected to be interested in the protection of their own timber as a resource. Working on this supposition it has been the endeavor of the office of the State Forester to organize the various interests in the county into fire protective associations in order that they might as an organization co-operate with the State in the matter of fire protection. This work has progressed in several counties and in order to standardize it a uniform set of articles of association and constitution and by-laws have been made out by the State Forester, and it is urged that each County Protective Association organized adopt these uniform articles of association with only such modifications as may appear locally necessary. One of the essential features of the assocations so organized is that they shall become financially interested of themselves and for themselves in protecting the acreage of timber represented by the members of the association. When county associations are thus organized, it is possible then to arrange for co-operation with the State whereby the expenses of fighting and suppressing forest fires in the county are borne on approximately a half and half basis by the State and the County Forest Protective Association. In this way it is possible to secure a great deal more intensive patrol since the funds available are larger. Also, since the individuals, companies and corporations are themselves members of the association, they serve as a medium of publicity through which the danger from forest fires is brought to the attention of the public and the fact that forest fires are in a large measure preventable is impressed on the citizens of the county. Co-operation between the office of the State Forester and the county association is arranged for in a written agreement. It is not essential that one

county be used as a unit for the co-operative forest fire association. Several adjacent counties which have like interests may be advantageously included in one association. This is especially true where large holdings of individual corporations are embraced in several counties. The idea with regard to these co-operative associations is that they shall be made as flexible as possible consistent with uniformity of organization and which meet local conditions to the extent that it is feasible.

BOY SCOUTS.

In several states, and notably Michigan, the boy scouts have been utilized as a means of protection and prevention of forest fires. In Michigan, by special legislative arrangements, the boy scouts have become a part of the organization for the purpose of dealing with the forest fire danger. The school boys of Kentucky, particularly as organized in the boy scout movement, can accomplish a wonderful work in protecting and conserving the forests of the State as a resource and increasing the timber supply of the Commonwealth. In two counties, namely: Harlan and Bell, the boy scouts have already done a large amount of work in the direction of fighting forest fires and reporting forest fires which may occur. The State Forester is desirous of extending this co-operation between the boy scouts and the office of the State Forester as far as possible and will gladly explain in detail the co-operation desired upon request.

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